CLAIMS

What is claimed is:

1. A method comprising:

receiving a number of data packets on a real circuit and a number of virtual circuits, wherein the number of virtual circuits are within the real circuit such that the number of data packets on the real circuit have a first protocol encapsulation and the number of data packets on the number of virtual circuits have a second protocol encapsulation;

deencapsulating the number of data packets having the first protocol encapsulation;

deencapsulating the number of data packets having the second protocol encapsulation; and

forwarding the number of data packets having the first protocol encapsulation and the second protocol encapsulation based on an address stored in the number of data packets.

2. The method of claim 1, wherein the number of data packets are Internet Protocol (IP) packets.

3. The method of claim 2, wherein the first protocol encapsulation is IP over Ethernet.

4. The method of claim 3, wherein the second protocol encapsulation is a Point-to-Point Protocol over Ethernet.

5. A method comprising:

receiving a number of Internet Protocol (IP) packets over Ethernet on a real circuit, each IP packet over Ethernet having an Ethernet header and an IP address;

removing the Ethernet header from the number of IP packets;

receiving a number of IP packets within a Point-to-Point Protocol (PPP) over Ethernet on at least one virtual circuit, wherein each of the number of IP packets within the PPP over Ethernet includes a PPP header, a PPP over Ethernet (PPPoE) header, an Ethernet header and an IP address, wherein the at least one virtual circuit runs within the real circuit;

removing the PPP header and the PPPoE header from the number of IP packets within the PPP over Ethernet;

removing the Ethernet header from the number of IP packets within the PPP over Ethernet; and

forwarding the number of IP packets over Ethernet and the number of IP packets within PPP over Ethernet based on the IP address.

6. The method of claim 5, wherein the number of IP packets over Ethernet and the number of IP packets within the PPP over Ethernet are encapsulated in an Asynchronous Transfer Mode (ATM) protocol layer.

7. The method of claim 6, further comprising removing the ATM protocol layer from the number of IP packets over Ethernet and the number of IP packets within the PPP over Ethernet.

8. The method of claim 5, further comprising calculating the number of IP packets within the PPP over Ethernet that are being received from the at least one virtual circuit.

9. The method of claim 8, further comprising performing rate limiting on the at least one virtual circuit based on the number of calculated IP packets within the PPP over Ethernet.

10. A method comprising:

receiving a number of different data packets over Ethernet on both a real circuit and a number of virtual circuits running within the real circuit;

recursively performing the following for each of the number of different data packets:

upon determining that a received data packet is an Internet Protocol (IP) packet over Ethernet on the real circuit, removing an Ethernet header from the received data packet and forwarding the IP packet based on an IP address stored in the IP packet; and

upon determining that a received data packet is an IP packet within a Point-to-Point Protocol (PPP) over Ethernet on one of the number of virtual circuits, removing an Ethernet header, a PPP header and a PPP over Ethernet (PPPoE) header from the data packet and forwarding the IP packet based on an IP address stored in the IP packet.

11. The method of claim 10, wherein the number of IP packets over Ethernet and the number of IP packets within the PPP over Ethernet are encapsulated in an Asynchronous Transfer Mode (ATM) protocol layer.

12. The method of claim 11, further comprising removing the ATM protocol layer from the number of IP packets over Ethernet and the number of IP packets within the PPP over Ethernet.

13. The method of claim 10, further comprising calculating the number of IP packets within the PPP over Ethernet that are being received from the at least one virtual circuit.

14. The method of claim 13, further comprising performing rate limiting on the at least one virtual circuit based on the number of calculated IP packets within the PPP over Ethernet.

15. A network element comprising:

a number of input/output (I/O) cards coupled to a number of real circuits, wherein each of the number of real circuits include at least one virtual circuit, the number of I/O cards to receive a number of Internet Protocol (IP) packets over Ethernet on the real circuit and to receive a number of IP packets within a Point-to-Point Protocol (PPP) over Ethernet on the at least one virtual circuit; and

a forwarding card having an IP address table, the forwarding card to receive the number of IP packets from the number of I/O cards and to forward the IP packets based on the IP address table.

16. The network element of claim 15, further comprising a control card having a database of configuration information, the configuration information used to configure the forwarding card and the number of I/O cards.

17. The network element of claim 15, wherein the number of I/O cards to determine the number of IP packets within the PPP over Ethernet that are being received from the at least one virtual circuit.

18. The network element of claim 15, wherein the number of I/O cards to perform rate limiting on the at least one virtual circuit based on the number of calculated IP packets within the PPP over Ethernet.

19. A machine-readable medium that provides instructions which, when executed by a machine, cause said machine to perform operations comprising:

receiving a number of data packets on a real circuit and a number of virtual circuits, wherein the number of virtual circuits are within the real circuit such that the number of data packets on the real circuit having a first protocol encapsulation and the number of data packets on the number of virtual circuits having a second protocol encapsulation;

deencapsulating the number of data packets having the first protocol encapsulation;

deencapsulating the number of data packets having the second protocol encapsulation; and

forwarding the number of data packets having the first protocol encapsulation and the second protocol encapsulation based on an address stored in the number of data packets.

20. The machine-readable medium of claim 19, wherein the number of data packets are Internet Protocol (IP) packets.

21. The machine-readable medium of claim 20, wherein the first protocol encapsulation is IP over Ethernet.

22. The machine-readable medium of claim 21, wherein the second protocol encapsulation is a Point-to-Point Protocol over Ethernet.

23. A machine-readable medium that provides instructions which, when executed by a machine, cause said machine to perform operations comprising:

receiving a number of Internet Protocol (IP) packets over Ethernet on a real circuit, each IP packet over Ethernet having an Ethernet header and an IP address;

removing the Ethernet header from the number of IP packets;

receiving a number IP packets within a Point-to-Point Protocol (PPP) over Ethernet on at least one virtual circuit, wherein each of the number of IP packets within the PPP over Ethernet includes a PPP header, a PPP over Ethernet (PPPoE) header, an Ethernet header and an IP address, wherein the at least one virtual circuit runs within the real circuit;

removing the PPP header and the PPPoE header from the number of IP packets within the PPP over Ethernet;

removing the Ethernet header from the number of IP packets within the PPP over Ethernet; and

forwarding the number of IP packets over Ethernet and the number of IP packets within PPP over Ethernet based on the IP address.

24. The machine-readable medium of claim 23, wherein the number of IP packets over Ethernet and the number of IP packets within the PPP over Ethernet are encapsulated in an Asynchronous Transfer Mode (ATM) protocol layer.

25. The machine-readable medium of claim 24, further comprising removing the ATM protocol layer from the number of IP packets over Ethernet and the number of IP packets within the PPP over Ethernet.

26. The machine-readable medium of claim 23, further comprising calculating the number of IP packets within the PPP over Ethernet that are being received from the at least one virtual circuit.

27. The machine-readable medium of claim 26, further comprising performing rate limiting on the at least one virtual circuit based on the number of calculated IP packets within the PPP over Ethernet.

28. A machine-readable medium that provides instructions which, when executed by a machine, cause said machine to perform operations comprising:

receiving a number of different data packets over Ethernet on both a real circuit and a number of virtual circuits running within the real circuit;

recursively performing the following for each of the number of different data packets:

upon determining that a received data packet is an Internet Protocol (IP) packet over Ethernet on the real circuit, removing an Ethernet header from the received data packet and forwarding the IP packet based on an IP address stored in the IP packet; and

upon determining that a received data packet is an IP packet within a Point-to-Point Protocol (PPP) over Ethernet on one of the number of virtual circuits, removing an Ethernet header, a PPP header and a PPP over Ethernet

(PPPoE) header from the data packet and forwarding the IP packet based on an IP address stored in the IP packet.

29. The machine-readable medium of claim 28, wherein the number of IP packets over Ethernet and the number of IP packets within the PPP over Ethernet are encapsulated in an Asynchronous Transfer Mode (ATM) protocol layer.

30. The machine-readable medium of claim 29, further comprising removing the ATM protocol layer from the number of IP packets over Ethernet and the number of IP packets within the PPP over Ethernet.

31. The machine-readable medium of claim 28, further comprising calculating the number of IP packets within the PPP over Ethernet that are being received from the at least one virtual circuit.

32. The machine-readable medium of claim 31, further comprising performing rate limiting on the at least one virtual circuit based on the number of calculated IP packets within the PPP over Ethernet.